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ABSTRACT

Florida's Educational Reform Act of 1983 delineated a desired state for science K-12. In 1987, a study was conducted to determine the extent to which elementary school teachers were aware of the State's requirements and standards and were able to implement instruction to meet them. The format used to present and interpret the data was a discrepancy model comparing the desired state to the existing state. Key characteristics describing the desired state were derived from three state products for Florida schools: (1) a list of minimum standards for science; (2) a list of State standards of excellence for science; and (3) a series of course frameworks. The description of the existing data came from respondents' self-reported data and the responses to the data from those who interact with elementary teachers. This paper addresses the limitations of using written surveys to determine the condition of elementary science, the specific instrument and procedures used in this survey, and makes recommendations for follow-up studies. (CW)

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SCIENCE TEACHING IN FLORIDA ELEMENTARY SCHOOLS: A PRELIMINARY STUDY

by

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This study was conducted by the Research Committee of the Florida Association of Science Teachers chaired by Dr. Barbara S. Spector in conjunction with the Florida Association of Science Supervisors. Funding to support this research was provided by the Florida State Department of Education under a contract titled, Florida Elementary School Status of Science Survey.

Background

A series of national studies addressing the condition of science teaching in precollege institutions across the U. S. was published in the late 1970's and early 1980's (Donnellan, 1982, Mechling, 1982, National Science Foundation, 1978, Stake and Easley, 1978). These studies reported that elementary teachers suffered from "science anxiety" and both the teachers and their principals perceived that the teachers were inadequately prepared to teach science.

A study by Stake and Easley (1978) suggests that not even half of the nation's elementary students have a single year in which a substantial share of the curriculum is devoted to science, and the teacher does a good job of teaching it. Many teachers ignore science completely.

Science anxiety has combined with the "back to basics" movement (in which science was excluded from the basics) to inhibit progress in elementary science teaching at a time when our need for scientific and technological expertise

is growing daily. (Spector, 1987)

In 1982, the condition of precollege science teaching in Florida mirrored the situation nationally. The Florida State Legislature, responding to crisis, passed landmark legislation in 1983 and 1984 in which steps were taken to improve the condition of science teaching in grades 6-12 (middle/junior and senior high school).

The 1983 Educational Reform Act mandated the delineation of a "desired state" for science taught K-12 in Florida. Teachers from all levels, science supervisors and university faculty worked in teams to identify that which Florida's students should know about science K-12. The products resulting from this participatory process were presented in three formats; (1) a list of Minimum Standards for Science, (2) a list of State Standards of Excellence for Science, and (3) a series of course frameworks. Each of these products underwent several rounds of review by the 67 school districts and educational organizations including unions and parent groups throughout the state before they were finalized. Thus, the desired state was derived to specifically meet Florida's needs and accordingly reflects the trend in the rest of the nation.

In order to maximize the outcomes at the upper grade levels, students need to acquire a solid science foundation in the elementary grades. In Florida, no research study specifically addressing the status of science teaching in elementary schools had been conducted. Therefore, the Florida Association of Science Teachers and the Florida Association of Science Supervisors submitted a proposal to the Florida State Department of Education to conduct a survey to assess the status of elementary science. This proposal contained specific parameters outlining the type of information to be sought and the scope of the audience to be surveyed. The Florida State Department of Education contracted with the Florida Association of Science Teachers to implement the study, and the project was assigned to the Florida Association of Science Teachers' Research Committee.

The State's decision makers at all levels needed a data base upon which to build action plans that would move elementary science teaching toward the desired state. Information sought included: (1) whether elementary teachers were aware that State standards had been generated for science in the elementary schools; (2) whether teachers had adequate funds to teach science; (3) how the State standards compared to what teachers were actually doing;

(4) whether elementary schools had environments supportive of the desired state of science teaching; and (5) whether teachers' attitudes towards teaching science and their perceptions of their own qualifications for teaching science supported the desired state.

A participatory process involving interested parties from the Florida Association of Science Teachers, the Florida Association of Science Supervisors, and the Florida State Department of Education was used to generate the survey questions. Questions were organized under the following topics: organization and administration; instructional methods; program emphasis; classroom procedures; evaluation; curriculum guidelines; resources and materials; safety; and teacher attitude and professional involvement.

Information regarding the respondents' educational backgrounds facilitating the teaching of science was requested on the questionnaire cover sheet. This information included:

- (1) undergraduate and/or graduate preparation in science;
- (2) the numbers of hours of inservice and/or college courses in elementary science methods; and (3) college science completed within the past three years. This cover sheet was not returned by the majority of the respondents. The directions were explicit about returning the scantron sheet with the responses to the body

of the questionnaire, but were not explicit about returning the cover sheet with it. Absence of these data significantly impacted the interpretation of the survey data.

Procedure

In May of 1987, the "Florida Elementary Schools Status of Science Survey" was distributed to 357 elementary schools. These schools were located in nine counties. The nine counties were chosen from counties with high, moderate, and low population densities as reported by FTE count. All of the elementary schools in each county received surveys. A total of 1071 surveys was sent out. Principals at each of the elementary schools received the following materials: one letter to the principal; three letters with teacher instructions, survey questionnaires, and return envelopes for teachers. In order to help randomize the sample, principals were asked to distribute materials according to the following criteria: (1) Use teachers from three different grade levels, at least one K-3 and one 4-6; and (2) give the survey to the teacher whose initial for his/her last name is closest to the beginning of the alphabet. (Copies of the materials sent to schools may be obtained by contacting the authors). A Likert scale was used (strongly agree, agree, no opinion, disagree, strongly disagree) for most questions. Some questions used a

yes, no, do not know scale. (See Figure 1 for sample items)

Insert Figure 1 About Here

Thirty-three percent (322 teachers) responded by returning the completed scantron sheet for the survey questions (Table 1). This represented 31% of the schools in the sample.

Insert Table 1 About Here

In addition, demographic data from the survey showed the following: 47% of the responding schools were in an urban location, 45% were in a suburban location, and 8% were in a rural location.

Regarding the size of the responding schools, 10% were small (300 or fewer students), 41% were moderate (301-600 students), 47% were large (601-1200 students), and 2% had over 1200 students. Fifty-five percent of the respondents represented grades K-3 and 45% represented grades 4-6 (Table 2).

Insert Table 2 About Here

A summary of the data collated from the scantron sheets was presented to elementary and secondary teachers and people who interact with elementary teachers, such as, people who teach

summer institutes, university supervisors of elementary interns, and state and district science supervisors. Reactions to the data and interpretations of the data were solicited from these people through an open session at the Miami Regional Convention for the National Science Teachers Association, the Board of Directors Meeting of the Florida Association of Science Teachers, delphi procedures with the Florida Association of Science Teachers' Research Committee, and informal personal contacts with interested individuals. These data were compared with the data self-reported by the respondents, and both of these sources were reflected in the interpretation of the condition of elementary science that follows.

Data

The data collated from the scantron sheets appear in attachments A and B. In attachment A, the questionnaire is used to display the percentage of teachers selecting each response. Attachment B gives an overview of each section by detailing the percentage of teachers agreeing with each position on the questionnaire.

Interpretation

In the strictest interpretation of survey data, the information obtained is applicable only to the audience surveyed. How

reasonable it is to assume that the findings are generalizable to the entire population depends on the degree to which the respondents characterize the broader population of which they are a part. Data from on-site experience of those who work with elementary teachers contradicted the respondents' self-reported data in this study. This suggested that the respondents in this survey may not have been typical of the general population.

An atypical population could have resulted if either of the following occurred. (1) The principals distributed the surveys to those teachers who were most disposed to teaching science, (2) If the principals followed the directions, but the 70% of the recipients did not respond because they do not teach science while the 30% who did respond do teach science. It is reasonable to assume that either of these may have taken place because of the pressures perceived by both principals and teachers to demonstrate excellence in this State.

When analyzing the data, additional questions emerged because of pitfalls inherent in the use of a written, closed-ended, self-reporting survey paradigm with an audience that may not be current in the vocabulary and information of the field. The respondent's individual interpretation of each question is based on his/her own perceptual screen. If the respondent's use of the

vocabulary is different from the author's use of the vocabulary, the response selected may not provide the data that was sought. For example, where teachers were asked if they had proper ventilation for science investigations, the authors meant mechanical movement of air to the outside. Follow-up with some teachers indicated that they answered "agree" even if the only air movement was in a closed air conditioning system. In some instances, teachers perceived that a window that could be opened or a closed air conditioning system provided proper ventilation because the activities they did with students did not involve any noxious or otherwise detrimental fumes.

Another example involved the interpretation of standardized tests. Follow-up indicated that some teachers limited their answers to national standardized tests such as, the CTBS, while others thought it meant countywide or buildingwide science tests at grade level.

The format used to interpret the data was a discrepancy model comparing the desired state to the existing state. Key characteristics describing the desired state were derived from the aforementioned three State products. The description of the existing state came from respondents' self-reported data and the

responses to the data from those who interact with elementary teachers.

DESIRED STATE

EXISTING STATE

1. State Standards
determine what is
taught.

73% are familiar with the State Minimum
Standards in Science for elementary
schools.

66% are familiar with the State
Standards of Excellence in Science for
elementary schools.

77% perceive that science curriculum
used in their schools includes the
State's Minimum Student Performance
Standards.

64% perceive that their school's science
curriculum includes the State's
Standards of Excellence.

71% use the textbook as the guide to
instruction.

This suggests that publishing companies are determining what is being taught.

An informal review of elementary science textbooks currently in use revealed that significant concepts from the State Standards were not included. This is reasonable given that manuscripts for the textbooks in use at the time of the study would have been completed prior to the existence of the Florida State Standards.

In order for teachers to have been including all the topics in the standards, they would have had to have been supplementing the textbooks with materials obtained from a variety of community resources.

This discrepancy suggests that teachers do not understand the State Standards and their implications for determining what is to be taught.

2. Science is taught
in a Science, Techno-
logy, and Society
STS context. (State
Standards J and K)

56% do not discuss uses and abuses of
science and technology.

71% use the textbook as the guide to
instruction.

STS, however, is not the context used in
textbooks. Textbooks use the organiza-
tion of the basic science discipline as
the context.

3. Safety is a
primary consideration
when science is taught.
(State Standard I)

71% use the textbook as the guide to
instruction.

Elementary textbooks have insufficient
coverage of safety.

74% are familiar with specific safety
procedures.

72% of the classrooms do not have
adequate eye protection (goggles for
individual student use).

49% of the classrooms do not have
appropriate fire protection (e.g., fire

extinguishers and/or buckets of sand or other extinguishing products).

46% do not have proper ventilation for science investigations.

This absence of safety equipment suggests that teachers' knowledge of safety is not as in-depth as is currently available, and/or their input is not used when decisions are made regarding budget expenditures impacting safety.

4. Instructional design focuses on hands-on activities.

28% use hands-on activities to teach science 65% or more of the time.

Hands-on activities provide the concrete experiences required for students to become proficient with process and problem solving skills. These are procedural skills and can be developed only through practice.

5. Instruction leads to proficiency with

53% do science fair projects.

process and problem

solving skills. (State
Standards A and B)

If students are not taught procedural skills by hands-on activities, the question arises as to the nature of the projects being done.

6. Principals support
science programs.

74% have administrative support for the implementation and enhancement of the science program.

62% are allowed time with pay to attend professional meetings/workshops related to science.

33% have professional journals such as, Science and Children and Pioneer in their schools for teacher use.

45% have science supplies and consumable materials replenished as needed.

22% have control over the classroom budget.

The teachers perceive they have administrative support for what they

do (teach textbook science). However, the characteristics displayed in their instruction (e.g., minimal hands-on activities) suggest that they don't have support for implementing programs that meet the State Standards.

7. Instructional resources are derived from partnerships with the community. (One of Commissioner Castor's Priorities)

75% say they do not derive resources from the community.

41% say they do have guest speakers.

59% do use the community for field trips.

8. Environmental education is taught.

41% do not teach environmental education.

50% do not teach marine science.

9. Curriculum addresses needs of special populations.

65% do not have special programs for gifted students.

82% do not have programs for handicapped students.

10. Evaluation of science programs is ongoing.

24% analyze standardized test to identify strengths and weaknesses in their school program when standardized tests are used.

18% found that when standardized tests were used, they actually measured the stated outcomes of the school's science programs.

Standardized tests are one commonly accepted vehicle to ascertain the effectiveness of a science program and serve as one source of feedback for ongoing refinement of courses. However, if the tests used do not measure the stated outcomes of a school's science program, their value comes into question.

A question of congruence among standardized tests and the goals for existing science programs emerged.

Program efficacy requires that ongoing evaluation be done.

11. Computers should be used in science instruction. 36% of the teachers use computers to assist science instruction.

12. Teachers are confident teaching science. 80% felt confident teaching science at grade level.

71% use the textbook as a guide for instruction.

This finding does not mirror the national picture.

Insight regarding this difference may be gleaned from the following.

(1) Believing that appropriate science instruction is found within the covers of a textbook, teachers feel confident because they use the textbook as a guide to teaching. (2) An elementary teacher at the Regional NSTA Meeting in Miami said, "When I took the job I knew science but now I know how little I really do know about science."

Conclusion and Implications for the Future

The survey raised as many questions as it answered.

Consequently, it would be useful to do a follow-up study before generating appropriate action plans for the State. The data obtained in this preliminary study need to be confirmed using a sample population that is typical of all elementary teachers in the State. Further, it is necessary to determine

1. whether the teachers actually apply the State guidelines of which 71% say they are aware
2. whether teachers actually teach science for at least the minimum minutes set forth by the State or county
3. what percentage of the actual teaching time is devoted to hands-on activity
4. to what extent the teacher's knowledge is used when decisions are made regarding curriculum, budget, safety, facilities, materials, and supplies
5. the educational background of the respondents and correlate it with their responses and the nature of the science program which they implement.

Figure 1 (Sample Survey Questions) showed the forerunners for these questions.

The follow-up study should provide for the triangulation of data. On-site visits, teachers' written self reports, and interviews are appropriate vehicles for this data collection. Appropriate respondents include the teachers, their principals, people who are out in the field interacting with elementary teachers such as, people who taught the summer institutes, university supervisors of elementary interns, and state and district science supervisors. Among the populations to be surveyed are elementary teachers at the beginning of summer institutes in science, and teachers in their schools during the academic year. Teachers in target schools for site visits can be notified at the opening of school that site teams would appear unannounced three times during that semester. This could be arranged through the Florida Association of Science Supervisors. Data would be collected from respondents, other than elementary teachers, at their statewide professional meetings.

The questionnaire used for this preliminary study needs to be refined and questions addressing the above information added before being used with another sample population. This, plus the other data collection procedures suggested, should be completed

before finalizing decisions regarding (1) what is needed, (2) who should do what, and (3) whose responsibility will it be.

For readers interested in ascertaining the status of science in elementary schools in their states, it is suggested that the recommendations in this section be incorporated in the design of any study that is to be undertaken.

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FL. ELEMENTARY SURVEY

5 = Strongly Agree; 4 = Agree; 3 = No Opinion; 2 = Disagree; and
1 = Strongly Disagree

In my classroom, I use the following instructional methods or activities when teaching science:

- | | |
|---|-----------|
| 10. student hands-on activities | 1 2 3 4 5 |
| ----- | |
| 24. I feel confident teaching science at my grade level. | 1 2 3 4 5 |
| 29. I control the classroom budget for science. | 1 2 3 4 5 |
| 32. I am familiar with the State Standards of Excellence in Science for elementary schools. | 1 2 3 4 5 |
| 33. I am familiar with the State Minimum Standards in Science for elementary schools. | 1 2 3 4 5 |
| 34. My science course is guided by the student's textbook and/or the teacher's edition of the textbook. | 1 2 3 4 5 |
| 35. Science supplies and consumables materials are replaced or replenished as needed. | 1 2 3 4 5 |
| ----- | |

1 = yes 2 = No 3 = Do not know

- | | |
|---|-------|
| 40. The county goals and objectives for instructional programs include a scheduled time of approximately 25 minutes/day (K-3) and 30 minutes/day (4-6) for science. | 1 2 3 |
|---|-------|

Figure 1
Sample Survey Questions

FL. ELEMENTARY SURVEY

COUNTY SIZE	COUNTY	FTE RANKING	NUMBER OF SCHOOLS	RESPONSES	
				INDIVIDUALS	SCHOOLS (NO.)
LARGE	BROWARD	2	98	92	31
	DUVAL	4	95	74	27
	PINELLAS	5	73	69	23

MEDIUM	VOLUSIA	12	35	52	18
	LEON	16	20	10	4
	SARASOTA	18	17	12	4

SMALL	PUTNAM	28	8	3	1
	HIGHLANDS	37	6	7	3
	JACKSON	40	5	3	1

TABLE 1. DESIGNATED COUNTIES FOR FLORIDA ELEMENTARY SCHOOLS
STATUS OF SCIENCE SURVEY

FL. ELEMENTARY SURVEY

LOCATION OF SCHOOL		
URBAN PERCENT	SUBURBAN PERCENT	RURAL PERCENT
45	47	8

SIZE OF SCHOOL			
SMALL (300 OR LESS) PERCENT	MODERATE (300-600) PERCENT	LARGE (601-1200) PERCENT	(>1200) PERCENT
10	14	47	2

PERCENT RESPONSES PER GRADE LEVEL						
K	1	2	3	4	5	6
10	13	14	18	17	23	5

TABLE 2. DEMOGRAPHIC DATA FOR FLORIDA ELEMENTARY SCHOOL
STATUS OF SCIENCE SURVEY

Attachment A

Data Collated from Scantron Sheet Displayed on Questionnaire

Bubble appropriate response:

- 5 Strongly agree
- 4 Agree
- 3 No opinion
- 2 Disagree
- 1 Strongly disagree

Part A	Agree	No Opinion	Disagree
1. Science instruction in my school is departmentalized in the intermediate grades.	29	9	60
2. The science program in my school is interdisciplinary. (In other words, mathematics, art, reading, and writing are integrated with science.)	54	10	35
3. Teachers in my school cooperatively plan for the teaching of science.	42	16	41
4. The administration in my school supports and is readily available for implementing or enhancing the science program.	74	8	17

Attachment A

5. Science-related activities are included when inservice education is planned at my school 58 16 26
6. The teacher-pupil ratio in science classrooms does not exceed 1 to 25 (K-3) or 1 to 30 (4-6) 56 5 40

In my classroom I use the following instructional methods or activities when teaching science: (Statements 7-15)

(Use % to show extent on

7. and 8.)	0-10%	15-35%	40-60%	65-85%	>90%
	1	2	3	4	5
7. content-oriented instruction.	4	10	36	34	16
8. student hands-on activities.	9	30	32	17	11
9. teacher demonstrations.	5	20	17	47	11
10. process-oriented instruction.	7	17	23	43	8
11. small group activities or projects.	11	19	14	43	13

Attachment A

12. independent activities for individuals at interest or learning centers.	16	20	11	37	16
13. student science fair projects.	25	13	9	21	32
14. the community for field trips.	18	14	9	37	22
15. guest speakers from the community.	29	17	13	34	7

Bubble appropriate response:

- 5 Strongly agree
- 4 Agree
- 3 No opinion
- 2 Disagree
- 1 Strongly disagree

3 Agree No Opinion Disagree

16. In my classroom students are allowed to use calculators for science.	25	26	49
17. In my school computers are used to assist science instruction.	36	21	42

Attachment A

In my school there is emphasis on: (Statements 18-23)

18. environmental education programs (including outdoor education).	59	15	25
19. marine science educational programs.	50	19	30
20. special science programs for gifted students.	35	27	38
21. special science programs for handicapped students.	18	35	46
22. discussion of uses and abuses of science and technology.	44	27	28
23. introduction of science careers.	56	20	24

24. I feel confident teaching science at my grade level.	80	8	13
25. I am familiar with the work regarding children's miscon- ceptions in science.	53	22	25
26. Teachers in my school are asked for suggestions to improve science activities.	55	14	30

Attachment A

27. Teachers in my school are involved in writing or revising <u>district</u> science programs.	33	20	46
28. Teachers in my school are involved in writing or revising <u>school</u> science programs.	40	19	41
29. I control the classroom budget for science.	22	11	21
30. I perceive a need for a science resource person in my school.	65	14	21
31. Teachers in my school are allowed time with pay to attend professional meeting/workshops related to science.	62	15	23
32. I am familiar with the State Standards of Excellence in Science for elementary schools	66	14	19
33. I am familiar with the State Minimum Standards in Science for elementary schools.	73	12	15

Attachment A

34. My science course is guided by the student's textbook and/or the teacher's edition of the textbook.	71	7	22
35. Science supplies and consumable materials are replaced or replenished as needed.	46	16	37
36. Furniture in my classroom is fixed in place and therefore limits group activities.	20	6	74
37. In my school basic concepts and facts to be mastered by students at each level of instruction have been established.	72	11	17
38. When standardized tests are used in science, a thorough analysis is made to identify strengths and weaknesses in the program and teaching strategies in my school.	24	36	38

Attachment A

39. My school has determined that
when a standardized test is
used for testing in science, it
actually measures the stated
outcomes of the school's
science program. 18 43 38

Part B.

Bubble appropriate response:

1 Yes

2 No

3 Do not know

% Yes

No

Don't

Know

40. The county goals and objectives for
instructional programs include a
scheduled time of approximately 20
minutes/day (K-3) and 30 minutes/day
(4-6) for science. 77 10 7

41. A county developed curriculum guide
for science is used in my school. 83 7 6

Attachment A

42. The science curriculum used in my school includes the state's minimum student performance standards.	77	5	16
43. The science curriculum used in my school includes the state's standards of excellence.	64	7	27
44. The county guidelines for science instruction encourage independent activities and/or projects.	74	10	13
45. My school subscribes to professional science education journals such as, <u>Science and Children</u> and <u>Pioneer</u> , for teacher use.	33	31	33
46. I am familiar with specific safety procedures for science investigations.	74	15	7
47. My classroom has the proper ventilation for science investigations.	54	27	15
48. My classroom has the appropriate fire protection for science investigations.	51	33	13

Attachment A

49. My classroom has the adequate eye and face protection for student use during science investigations.	18	63	16
50. My school has appropriate storage for equipment and chemicals.	39	43	15
51. Local businesses, industries, and government agencies provide resources for the teaching of science in my school.	25	44	25

PLEASE WRITE ANY ADDITIONAL COMMENTS
ABOUT YOUR SCHOOL'S SCIENCE PROGRAM
ON THE PAGE BELOW OR ON THE BACK OF THIS PAGE.

Attachment B

Data Collated from Scantron Sheets

Part A items 1-6

29 percent of the teachers surveyed say science is departmentalized, 42 percent say they cooperatively plan for teaching science, 54 percent say science is interdisciplinary, 58 percent say science-related inservices occur, 56 percent say the teachers-pupil ratio does not exceed state mandated quotas. 74 percent of the teachers surveyed say that the administration in their school supports science programs.

Part A items 7-15

In the methods addressed in this section, respondents reported when they teach science that: 50 percent use content-oriented instruction 65 or more percent of the time, 58 percent use teacher demonstration 65 or more percent of the time, 51 percent use process-oriented instruction 65 or more percent of the time, 56 percent use small group instruction 65 or more percent of the time, 53 percent use independent projects 65 or more percent of the time, 53 percent use science fair projects 65 or more percent of the time, and 59 percent use field trips 65 or more percent of the time.

Attachment B

Methods used less than sixty-five percent of the time when teaching science:

student hands-on (28%)

guest speakers (41%)

Part A items 16-17

25-36 percent of the teachers surveyed say they use calculators (25%) and computer (36%) for science instruction.

Part A items 18-22

The school emphasis on special programs is 18 percent for handicapped students, and 35 percent for gifted students.

Part A items 24-31

80 percent of the teachers surveyed say they are confident teaching science, 33 percent say that teachers in their schools are involved in writing or revising district science programs, and 40 percent are involved in writing school programs. 22 percent say they have any control over the classroom budget for science. 65 percent said they perceive a need for a science resource person, and 62 percent said that teachers in their schools are allowed with attend professional meetings/workshops related to science with pay.

Attachment B

Part A items 32-39

66 percent of the teachers surveyed say they are familiar with the State Standards of Excellence, and 73 percent say they are familiar with the State Minimum Standards. 73 percent of the respondents state that their science course is guided by the text. 24 percent teachers surveyed said that analysis of standardized tests are used to identify strengths and weaknesses, and 18 percent stated that standardized tests actually measures the stated outcomes of the school's science program.

Part B items 40-45

Teachers surveyed say 64-83 percent of the time they know county, state and local guidelines for teaching science. They also say that their schools subscribes to science education journals 33 percent of the time.

77 percent of the respondents reported they know county goals and objectives for instructional programs include a scheduled time of approximately 20 minutes/day (K-3) and 30 minutes/day (4-6) for science. 83 percent said a county developed curriculum guide for science is used in my school. 77 percent stated that the science curriculum used in my school includes the state's minimum student performance standards, 64 percent said the science curriculum used in my school includes the state's standards of excellence.

Attachment B

74 percent of the respondents stated the county guidelines for science instruction encourage independent activities and/or projects.

Part B items 46-51

In regard to safety 74 percent surveyed say they are familiar with specific safety procedures. 54 percent say they have proper ventilation, 51 percent fire protection, 18 percent have eye protection, and 39 percent have proper storage for equipment and chemicals.

41 percent of the respondents reported that they used guest speakers in their classroom, 25 percent stated that local businesses, industries, and government agencies provide resources for teaching science at their school.